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ABSTRACT

Differentiation practices are defined by the Scottish Office Education Department as the identification of, and effective provision for, a range of abilities in one classroom, such that pupils in a particular class need not study the same things at the same pace and in the same way at all times. This issue of the "Interchange" describes two studies of differentiation practices in primary and secondary schools. The first study investigated how primary teachers allocate different work to different pupils and the extent to which they match the work to the pupils' achievement levels. The second study examined differentiation practices in four secondary school subject areas, mathematics, science, English, and modern languages, showing the pattern of differentiation in different subjects, the constraints on developing differentiation, and what pupils need to optimize their learning. Results indicated that differentiation practices can be successful when teachers share with pupils the management of their learning, promote the belief that achievement can improve, use a wide range of sources of information and support, identify a range of needs, and give and receive continuous feedback. (AP)

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# INTERCHANGE

No 30

## Studies of Differentiation Practices in Primary and Secondary Schools

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# Studies of Differentiation Practices in Primary and Secondary Schools

**Mary Simpson and Jenny Ure**

*Northern College, Aberdeen Campus*

In commissioning this research, the Scottish Office Education Department (SOED) identified the central problem of differentiation as follows: *'Despite encouragement and the increasing availability of appropriate resources, teachers seem to find it difficult to practice differentiation.'*

## The Primary School Study

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### *Introduction*

The first study commissioned was of differentiation practices in the primary school. The working definition which the SOED gave for differentiation in this context was: *'the identification of, and effective provision for a range of abilities in one classroom, such that pupils in a particular class need not study the same things at the same pace and in the same way at all times. Differentiated approaches should mean that the needs of the very able, and of children with learning difficulties, are discerned and met.'*

This first study therefore comprised:

- an investigation of differentiation practices which looked at how and why teachers allocate different work to different pupils and the extent to which the work allocated 'matched' the attainment levels of the pupils;
- an 'action research' phase in which the results were discussed with teachers and subsequently acted on to determine the factors which shaped the patterns of match and mismatch, and what hindered or promoted effective differentiation.

### *The sample*

The researchers made intensive classroom observations of a small group of individually identified pupils and their teachers. Six experienced teachers regarded as good differentiators, from different schools and at different primary stages, were nominated by their local authority to participate in the first stage of the project. Each teacher selected six pupils in his or her class as 'target' children, on the basis of her perceptions of the pupils' levels of attainment in the class: two pupils from top groups, two from middle groups and two from bottom groups.

Over four months, researchers studied a random sample of 232 tasks allocated to these 36 pupils -- half of these in mathematics, half in language and other curricular areas. The results were discussed, formally and informally, with the participating teachers, with a variety of teacher groups and with individuals. The teachers' views on the reasons for the patterns found were explored and 11 teachers were supported in their own subsequent investigations of aspects of differentiation in their classrooms.

## How well did tasks given to pupils match their capabilities?

To find out why they gave a particular task to a pupil being observed, teachers were interviewed briefly when allocating the work. To assess what the pupil actually experienced, a detailed record was made of the pace and manner in which the task was tackled, the help which the pupil sought and received from others, the mistakes made, the quality and quantity of the end product, as well as the child's general emotional response — such as, 'interested', 'bored', 'challenged', 'upset'.

Finally, researchers discussed the task with the pupil and carried out a diagnostic assessment of the level of the pupil's attainment or understanding in the task, for example — was the work well within the child's capabilities, could he/she do more difficult work in that topic area? If he/she made any mistakes, was it due to carelessness or distraction, or to underlying comprehension problems?

Whether each task matched, over- or underestimated the capabilities of the pupil involved was then determined independently by three separate judges from the evidence gathered.

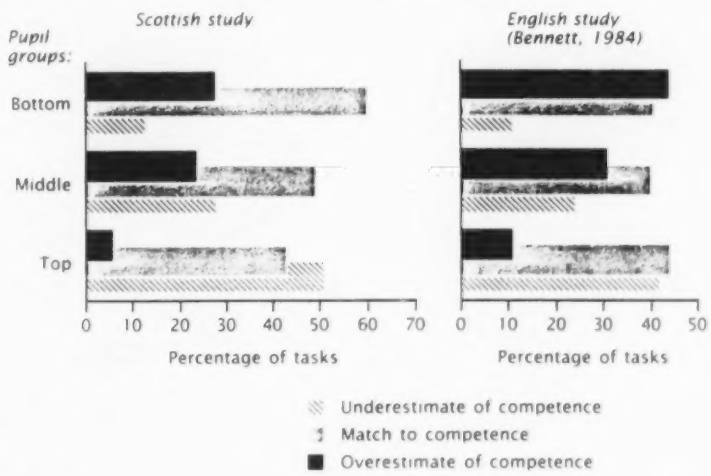
The 'match' between the tasks pupils were given to do and what they were judged to be capable of doing is shown in Figure 1 below. The pattern of findings was strikingly similar to that reported in a similar study of differentiation in English primary schools in 1984 by Bennett and colleagues.

For this sample of pupils, those in the top group were capable of more advanced work in 50% of the tasks they were given to do. Teachers in our study indicated that they did not wish to 'push on' their able pupils, preferring to offer them 'breadth'. However, our data showed that one third of such tasks were experienced by pupils as unintended additional practice. These observations reflect on a difficulty which teachers face when a pupil is given something to do and he or she can do it — the teacher cannot see 'the gap ahead', that is, how far in advance of this work the child is actually capable of performing.

In contrast, the pupils in the bottom groups were more likely to be over- than underestimated — they were actually the ones being 'pushed on'. But they had the highest level of match, doubtless because teachers are quick to notice when a child is in difficulties and are thus able to respond by selecting a more appropriate next task. Nevertheless, in 20% of the tasks intended as practice, these pupils experienced them as new work, or work which they did not understand.

Pupils in the middle groups were almost as likely to be over- as underestimated, indicating that the teachers were allocating work which was more evenly balanced around the level of the pupils' capabilities than with the other two groups.

*Figure 1: The match between pupils' capabilities in the specific topic area and the tasks allocated by teachers*



**Comments on the 'match' results**

Because they were derived from an intensive study of a small sample of individual pupils, the findings do not necessarily represent the pattern which will be found in every classroom in Scotland, and indeed there were some variations in the results from different classrooms involved in the study. The figures should be treated as a useful starting point for discussion of the possible patterns to be found in different learning contexts. On the other hand, while the results were not derived from a random sample, the general pattern was very strong — it mapped across very well to the results derived from the much bigger study undertaken a few years before in England.

## *Which pupils were disadvantaged by the mismatch?*

**The research finding that some pupils seemed to be getting work which did not match their ability, prompted much debate. Which pupils suffered more educationally from the mismatch: those who had work that was too easy or those who had work that was too hard?**

In discussions with the participating teachers and subsequently with a wider group, concern was expressed at the finding of a high level of underestimation of the knowledge and skills of more able pupils. All agreed that this failure to provide challenge and stretch amounted to a significant failure in educational provision. Nevertheless, pupils in this category experienced little failure and were thus learning to be confident learners; they had abundant (if to some extent unplanned) opportunities to practice — a process which allows skills to become automatic; they experienced breadth (though less than intended) through problem-solving activities which allow fine-tuning and generalisation of knowledge; and they had the satisfaction of being able to help others with their difficulties — another process which allows practice and consolidation of what they have already learned.

The data show that it was the pupils in the lower groups who experienced the highest level of matched tasks. Nevertheless, for almost a third of the time they were struggling with work they did not understand and in which they were not getting practice in the sense of the 'polishing of skills'. They were the ones who appeared to be 'pushed on' at a rate which was too fast for their comfort. They did not have as much real practice as the teachers thought they should be getting — they were struggling to master new skills, not practising and polishing those which had already been acquired — and they had the demotivating experience of always being on the receiving end of help rather than on the giving end.

This process of 'compression' of the learning rates of different groups of pupils is recognised as occurring within the educational systems of other countries:

*'Current patterns of North American education require that more capable students wait while less capable students catch up.'*
*'When I am finished with my class in June, the slow children are a little faster and the fast have slowed down a bit'*

Arlin, 1984

## What shaped teachers' practice?

The overall results were reported back to the participating teachers in a series of meetings at which the pattern of match and mismatch and the degree of over and underestimation were discussed.

Although they were disappointed by some of the figures on mismatching, the teachers agreed that the trends in the figures for over and underestimation were a true reflection of the pattern of experiences of children within their classrooms. The similarity of the pattern of these results and those of the English study suggest that they did not arise as a result of idiosyncratic deficiencies in the teachers, but were the result of features of the schooling system itself.

The following were identified as key aspects of the primary education system which, in the teachers' views, shaped their differentiation practices:

### The number of children or groups in a classroom

In agreement with the researchers' observations, teachers confirmed that in managing pupils with differences in attainment levels, they were able to cope with a limited number of ability 'units'. This normally amounted to three or four groups, along with perhaps two or three individuals at a time. The children selected for individual attention outwith groups were always low-attaining children.

### The spread of ability in their class

Everyone recognised the educational benefit to average- and lower-attainment children of the presence of the whole range of talents in the classroom, and felt it was a good thing for higher-attaining children to work alongside and perhaps to help slower learners, who might well show talents in non-academic tasks.

### The variety of learning needs

In assessing the tasks, the researchers had considered only the pupils' 'academic need', whereas the teachers had also to bear in mind social and emotional needs. The teachers felt that academically bright children were often found to be emotionally immature in comparison with their academic ability, and therefore benefited from working with children of their own age, even if they were not fully challenged by the immediate task in hand.

### The distribution of resources

The most precious and limited resource was the teachers' time and it was essential for them to prioritise its distribution. Teachers said that they tended to select the lower-ability groups or individuals for special attention or for special resources (for example, input from learning support).

**Children as a resource in the classroom**
Because the more able children could get on with their work with less supervision, and indeed could help others, they were frequently regarded as a valuable resource in the classroom. The teachers felt that they acted as models for other children on how to engage with work, on how to behave or how to tackle a problem, and this modelling was sometimes a more effective aid to learning than the didactic efforts of the teacher.

**'Breadth' rather than 'length'**
When planning for children who could readily master the skills and content of the curriculum, teachers expressed a unanimous preference for offering 'breadth' in the curriculum, rather than allowing children to 'shoot ahead' of their peers. They agreed that it was difficult not only to decide what constituted 'breadth' in a topic area, but also to find the time to support able pupils in genuinely challenging open-ended problem-solving tasks.

**Limited range of resources**
The teachers' ability to offer 'breadth' was sometimes hindered by a limited range of resources. Schools differed widely in the range of equipment, books and computers which were available.

**Pressure to cover the curriculum**
The teachers experienced pressure from both outside and inside the school to include a large number of activities across a wide curriculum, in addition to dealing effectively with 'the basics'.

**Mastery of basic skills**
Teachers argued that it was not necessarily disadvantageous to some pupils that they experienced more practice tasks than were intended , since an overwhelming concern of teachers was that basic skills should be mastered.

**The demands of the next stage**
The teachers had to consider the remit of the next teacher, the requirements of the next stage of the curriculum, or the school to which the children would be going. They were concerned that children should master certain basic skills before moving on, that children should not be spread over too many books, especially in mathematics (in some schools), and that pupils at the top end of P7 should not have to repeat work when they got to secondary school.

## *How did teachers think differentiation might be improved?*

Teachers were asked by the researchers what would improve the effectiveness of their differentiation.

They identified three factors:

**More time to interact with pupils**
Teachers wanted to spend less time on routine management in the classroom, and to have more time to talk, listen, guide and observe. They felt that giving pupils a greater degree of responsibility for the management of their own learning was the most desirable way to achieve this.

**Better information about the attainment of the pupils**
Although teachers felt they would be able to manage differentiation more effectively if they had detailed information on pupils' attainments passed on from the previous class, they recognised that if more information became available, they would have difficulty in coping with it. The development of strategies for sharing the information load with pupils has subsequently become a priority in some schools.

**Better information on the progression of skills and knowledge in the curriculum throughout the primary school**
Since this study was completed, the 5–14 guidelines have been disseminated and offer teachers information on progression in key areas of the curriculum.

# The Secondary School Study

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## *Introduction*

Following from the primary school study, but differently designed, the study of differentiation in the secondary school comprised:

- a study of differentiation in four subject areas — mathematics, science, English and modern languages — in S1 to S4: how it is defined and managed and the constraints on the development of differentiation.
- a study of what pupils thought helped them to learn, how easy they found their work relative to teachers' estimates of their capabilities, and what they found different at Standard grade compared with S1/S2;
- an analysis of theoretical approaches to differentiation and what makes a teacher a 'good differentiator' in the secondary school.

## *The sample*

Fifteen schools were visited in the course of the study, and within these, 23 departments were selected for detailed investigation of their differentiation practices. In some cases initial visits indicated that it would be fruitful to do a detailed study of individual teachers; in others it seemed more appropriate to focus on whole departments. Information was gathered by:

- interviews: with headteachers, principal teachers, subject teachers and learning support staff, and with 60 pupils in S3/S4.
- observations in the classroom: for example of the activities of the teacher and pupils in a classroom; of the different kinds of tasks offered in any one lesson.
- scrutiny of documents: for example school and departmental policy and documents, resource materials and pupils' records.

## What is differentiation in the secondary school?

To avoid defining in advance what differentiation in the secondary school might mean and then limiting the study to practices which met the definition, the researchers asked a range of people in education — teachers, headteachers, advisers, college lecturers, HMI — where they thought 'good differentiation' was to be found, and made visits to many of the classrooms and departments mentioned.

The definition by Smith (1981) was felt to be an appropriate description of the variety of practices which the researchers encountered:
*'We can define differentiation as any process which divides pupils into subgroups which are then exposed to different educational experiences. Differentiation then covers a great range of phenomena from the allocation of pupils to different classes, subjects, sets, streams, bands or tracks within the same school, to the different treatment of pupils within the same classroom.'*

This definition, however, is so broad as to be unhelpful. The researchers, therefore, identified three locations where differentiation could take place:

**The pupil**
His or her placement on a work scheme, in a group or in a class, according to some perceived set of characteristics or level of attainment.

**The course or course materials**
Differing in level of difficulty.

**The activity of the teacher**
'Differentiation by dialogue'; the use of the face-to-face encounter with pupils to make a spontaneous response, which is differentiated according to a complex and ever-changing set of perceptions of differences in understanding and requirements for support.

## What shaped the pattern of differentiation in different subjects?

To look at how teachers managed differentiation in secondary classrooms and how they thought it could be improved, the researchers visited different subject departments and interviewed principal teachers, teachers and pupils, and examined materials and accounts of procedures in differentiation.

### Mathematics

The most common approach to differentiation in mathematics was the use of an individualised scheme; pupils sorted according to their level of attainment on tests and assigned to a sequence of materials which were graded according to level of difficulty. In classrooms which used fully individualised schemes — often with a range of resources such as computers, videos, cassettes — the teacher was primarily manager of the system, and frequently had little opportunity for actual teaching. Some, however, felt that teacher intervention was unnecessary since so much differentiation was built into the scheme and the resources.

Some teachers felt their individualised schemes were not working as well as they should be, and wanted to 'fine tune' these. They wanted to improve the measures of pupils' mathematics abilities, and to increase the number of levels, cores or extensions in the materials. Others felt that to strive for such precision would not be fruitful. Instead, they sought to group pupils together if they were roughly at the same stage of understanding, and to use individualised, group or class teaching as was appropriate for different parts of the mathematics curriculum.

### Science

In science, the most common approach to differentiation was the use of core and extension material. Pupils worked on different materials, not because they started at different points, as in mathematics, but because they finished at different points. Thus it was pace of work that determined whether extension material was undertaken, and there was seldom any clear rationale for the selection of some materials as more difficult than others. In addition, there was no built-in progression over the S1/S2 course; pupils merely tackled different topics at different times over the two years. Differentiation was not clearly based around the sorting of pupils or the materials of the course; teachers differed in the extent to which they actively taught or merely managed the resource-based scheme.

Many teachers felt that the best way forward was to develop core and extension material, and hoped that this work would not be replicated in every secondary science department in Scotland! However, because of the nature of the 5-14 environmental studies guidelines and the thematic approach of the primary schools, secondary teachers felt that it was difficult to find out where pupils were in their knowledge and understanding before putting them onto appropriate levels of work.

### English and modern languages

Some teachers of English and modern languages felt that they had 'no clear model of differentiation', perhaps because they saw differentiation as comprising a scheme with a range of tests and materials for sorting and routeing pupils. In these two subjects, mixed-ability classes and common texts or themes were the norm, and the differentiation was part of the teaching. One teacher of modern languages said:

*'Of course there are differences in terms of ability, but there are big differences in terms of performance as a consequence of other factors, such as the partners they are sitting with or the group they are in, the interest value of the lesson, the personal input from the teacher or from parents. I have a whole range of things to take into account when I'm teaching, though on an intuitive rather than a formal basis, I have to say. There is their lack of confidence, need for attention, need to be encouraged or chivvied, degree of basic competence, ability, ability to attend, high or low motivation, ability to work independently. You can't be infinitely flexible, but I do try to optimise the situation to take account of these.'*

Many English language teachers felt under pressure to introduce individualised schemes, for example three or four levels of texts, and were anxious because they felt that using such schemes, coupled with the detailed specifications of the 5–14 guidelines, would lead to the fragmentation of a subject which they regarded as 'holistic'.

One researcher noted:
*'In one particular English class in school X the teacher is regarded as a paragon by other teachers on how to do differentiation. He appears, however, to use the individualised scheme in a mechanistic way, using all the trappings of a differentiated curriculum, while ignoring, discouraging or putting down any student-initiated questions or responses. The message was clear that their contributions were unwelcome complications in his system.*

*'On the other hand, the second English teacher who was observed appeared to tap intuitively into and to develop the understanding and speaking skills of the pupils, engaging and stretching the whole class for the whole period, yet apologising afterwards for not differentiating.'*

Some departments were introducing different texts on a 'negotiated choice' basis, but were also developing flexible response strategies — for example selected support through help sheets — to deliver a substantially common course.

### What were the constraints on developing differentiation?

In interviews teachers were asked what they felt hindered the development and implementation of their differentiation practices.

Teachers identified three key factors:

**Class size**
*'It's only when you're speaking to them at a smaller group level that you're aware of what their problems are, rather than in a whole-class lesson.'* Teacher (Modern languages)

**The spread of attainment**
*'I have an incredible spread and I just don't have the time to devote to them. Not to stretch the good ones on'* Teacher (Science)

**Lack of time**
*'Time, time, time! ...we need to find time to develop support materials to plug the gaps.'* Teacher (English)

They also felt there were problems with: the difficulty of getting to know the pupils; the amount of work to be covered; lack of a clear model of differentiation; lack of consensus on how to improve; their lack of skills in specific areas (for example the management of group work); and the restricted availability of learning support input.

## What did pupils need to optimise their learning?

If differentiation is about 'meeting pupils' needs', the researchers needed to find out what pupils felt their needs as learners were, and under what conditions these needs were met. In interviews they asked pupils questions such as — 'What makes the most difference to how well you do in a subject?' 'What teacher gets the best out of you?' 'How do they do that?' 'If you could make one change in the class to really improve your performance, what would it be?'.

The pupils in this study gave a very robust picture of what for them was the best educational support for their learning. It is interesting that, despite their experiences of individualised schemes and resource-based learning, not one pupil mentioned 'matching', 'scheme', 'setting' or 'ability'. When asked what size of group or class was best, they indicated that it really depended on what they had to learn — sometimes working alone was best, sometimes in groups, sometimes in a whole-class setting. After collating the pupils' responses according to key words, phrases and viewpoints, a number of key factors emerged as important to their learning:

### The quality of their relationship with teacher

*Interviewer: 'So what do you think makes most difference to how well you do?'*
*Pupil: 'I think it is mainly the teacher.'*
*Interviewer: 'What specifically about the teacher?'*
*Pupil: 'Him being able to take your problems and discuss the problems over with you and sort of help you understand more or less about them.'*

Pupils recognised that hard work and interest in the subject were also factors, but quite often these were also related to their relationship with the teacher:
*'I find that I can relate to the teacher in English better. I can just speak to him — he is a friend as well. I like to work hard so he knows it is my thanks to him.'*

It became clear that the good relationship with the teacher was not just a social nicety, it set the context for interactions to take place which were highly supportive of the learning process.

### The quality of the teacher's explanations

A key word which cropped up again and again in the interviews was 'explanations'.
*'In Biology, everything is explained really well. Everybody is interested. Everybody does well because it is explained so well.'*
*'It's just the way he explains everything without making you sound stupid.'*

Could it be that some teachers felt that most pupils could understand something if only the right way of explaining it could be found, while others considered that some pupils were just not bright enough to understand and so there was no point in trying?

### The identification of learning difficulties

Where the relationship was good the teacher appeared to be more sensitive to the strengths and weaknesses of the pupils in the work of the course, and pupils were less inhibited about identifying their own problems and in seeking the teacher's assistance:
*'If you're stuck, you can just go up to him and he will sit and go over it and he will say "Go home and do it, and come back, and we will see if it's right or not".'*

*'He'll come round often and ask if you're doing OK. If we need help, we'll ask.'*
*'He won't, like, give you into trouble if you get it wrong or anything.'*

While these qualities may seem obvious to many teachers, it was clear from the pupils' comments that they were not evident in all classrooms:
*'You feel you are making an idiot out of yourself, asking the teacher. She says [funny voice]: "If there is anybody out there who doesn't understand, put your hand up and I'll help you." But everybody feels they are making an idiot out of themselves, so you don't bother.'*

Clearly an announcement such as that above is not enough in itself to encourage pupils to bring their difficulties to the attention of the teacher. And perhaps some teachers had their professional radar systems tuned to a different frequency!
*'I shouldn't think he'd notice if I didn't understand. But he'd notice if I wasn't working.'*

**Constructive feedback, on weaknesses as well as strengths**
Although teachers know that praise and success is motivating, the pupils signalled clearly that having their weaknesses identified — and being given advice on how to deal with them was equally important.
*'I know I'm not good at spelling. She just says "You'll need to work on your spelling", but I don't know how to.'*
*'The teachers are all very helpful in all subjects, but if they'd just sit down with you and tell you how you're doing and things. And if you are not good at something, tell you what you could do.'*

Pupils also thought there were others in the class who were unaware that their performance was well below average, and who perhaps did not know that they would need to improve if they were to succeed at Standard grade.
*'The teacher doesn't tell you (how you are doing). He expects us to know ourselves. If someone is good at English, they will know. Someone who is not very good, I don't think they would really know.'*

Pupils also put in pleas for a self-referenced (rather than a norm or criterion-referenced) system for feedback on assessment:
*'It was different in primary school. There's no-one here to tell me I'm getting better and better.'*
*'I think we should know more about what they think we should be doing. I think they should explain how we're supposed to do things, not just say "do this" and that's it. And I think you should know how you are doing yourself.'*

**In summary**
The message from pupils was clear — the quality of the interaction with the teacher, the quality of the explanations given and the quality of support and assistance given with identified problems was the key to the level and quality of their learning. The researchers had to conclude, as many others have already done, that no particular method of organising materials or pupils *in itself* leads to improved learning.

***Pupils needed to know:***

**Where they are going**
They needed to know what they should be learning. A handout on intended learning outcomes is not enough. Pupils may merely rote learn its contents, particularly if they cannot see the relationship between what they are doing in class and what they are supposed to learn from it.

**How well they are progressing**
Their plea for 'self-referencing' makes a lot of sense. A teacher may see some progress in the writing skills of a slow learner over a period of months, but all the pupil sees is that their work is worse than everyone else's and that they are always bottom of the class.

**How to overcome their problems**
Pupils did not like it when problems were not identified until it was too late for anything to be done, or if difficulties were identified but no help, guidance or support was given in how they might try to rectify matters.

**That there is a helpful monitor and guide alongside as their mentor**
The good relationship with the teacher set the context within which the pupils could have a productive interaction with this knowledgeable adult. The sharing of information, agreements about mutual and different responsibilities, shared pleasure in successful outcomes — all of these gave the phrase 'sharing the management of learning' its meaning.

## How well did demands on pupils match their capabilities?

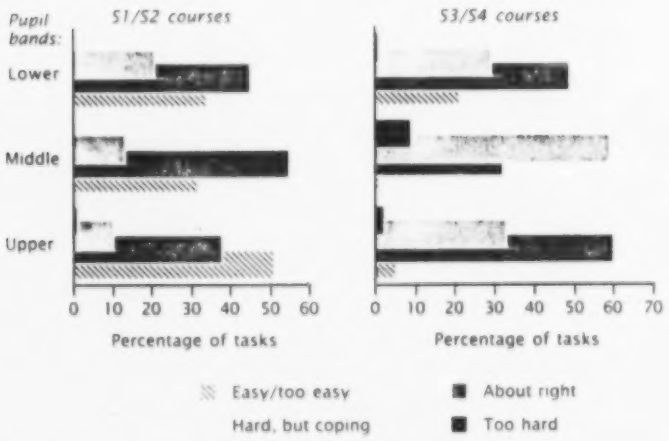
Pupils in S3 were asked to rate their experiences of S1/2 and S3/4 courses on a five point scale of difficulty. The pupils were identified by teachers as likely to gain certificates at F level (lower band), G level (middle band) or C level (upper band).

### Across all subjects

Figure 2 shows that, over all subject areas, approximately one half of the top band pupils found the work in S1/2 'easy or too easy'. The distribution for the middle band was also skewed towards the 'easy/too easy' end of the scale. The phenomenon of 'not knowing that you are not doing very well' is perhaps reflected in the high incidence (over 30%) of pupils who were in F level courses at Standard grade who also rated the S1/S2 courses as 'easy/too easy'. Less than 20% of pupils in any band were experiencing challenging courses in which they were working to capacity and which merited a rating of 'hard, but coping'.

Figure 2 also indicates that pupils' views of Standard grade courses were very different. More than 80% of the pupils following C level courses rated the demand as 'about right or hard, but coping'; the middle band indicated a similar level of demand, but skewed more towards 'hard but coping'. Perhaps this reflects the strategy adopted for some courses, to cover both C and G materials, and to allow pupils to 'find their own level'. The unexpectedly large group of pupils (20%) in F level courses who found the work to be 'easy/too easy' said that the general science course was responsible for this rating.

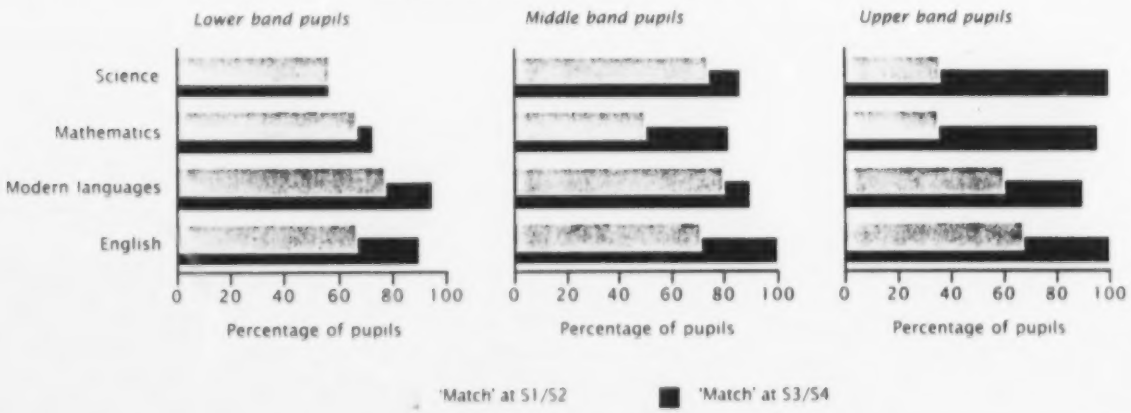
*Figure 2: Pupils' ratings of ease of tasks in S1/S2 and in S3/S4 courses according to pupils' ability band*




### For different subjects

It was not possible to conduct the kind of detailed study of matching that was undertaken with primary pupils. To attempt to estimate the degree of 'match' two categories were combined on the rating scale — 'about right' and 'hard but coping'. This, it was hoped, would give a reasonable assessment of

*Figure 3: Pupils' rating of work as 'about right' or 'hard, but I'm coping' in S1/S2 and in S3/S4 courses, according to subject area and to pupils' ability band*



the number of pupils who were working at an appropriate level — being stretched while not being strained.

Figure 3 shows that for all subjects and for all pupils but especially those on C level courses, 'matching' improved at Standard grade, with one exception— the pupils on the F grade general science course.

Briefly summarised, pupils felt things got better at Standard grade because:

- they had a clear goal;
- the pace was more appropriate than in S1/2;
- the standards were more appropriate than in S1/2;
- the methodology had changed;
- the pedagogy was more 'active'; that is, progress was more closely monitored; feedback was pointed and regular; explanations were more readily offered and understanding was checked.

One surprise was the extent to which English and modern languages teaching appeared to 'match' pupils' ability better than that of mathematics and science, suggesting that, despite the intricacies of the multi-levelled schemes in mathematics and science, pupils thought that teachers and courses in English and modern languages were more finely tuned to their learning needs. A principal teacher in mathematics identified a probable reason for this:

*'One of the most powerful weapons is teacher–pupil discussion, and the administration of mixed-ability differentiated learning schemes leaves little time for this.'*

## How can differentiation be understood?

After the interviews and other investigations had been completed, the researchers summarised and attempted to interpret the findings by setting them within alternative theoretical views of what differentiation might be.

The teaching strategies which teachers used to effect differentiation could be seen as lying in a continuum between two extremes (Figure 4).

*Figure 4: Two extremes of the spectrum of approaches to differentiation*

| *Approach 1* | *Approach 2* |
|---|---|
| Responding to a narrow range of needs | Responding to a wide range of needs (ability; attainment, cognitive; personal; pragmatic) |
| Using a 'systemised' identification of needs | Using 'personalised' identification of needs |
| Using materials 'matched' to recorded attainment | Using materials and strategies developed to meet a range of specific needs |
| Giving pupils responsibility for pace of learning | Having shared responsibility for learning |
| Having a high material input; low teacher–pupil input | Having a high teacher–pupil input; high materials input |
| Characteristic mode: resource based learning; individualised learning; programmed learning | Charactersitic mode: open learning; adult learning; special educational needs |
| Dominant mode of assessment: criterion referenced tests | Dominant mode of assessment: diagnostic assessment and criterion-referenced tests |
| Dominant locus of differentiation: differentiated materials/courses | Dominant locus of differentiation: 'differentiation by dialogue' |

Approach 1 typically underlies the use of mathematics and science schemes. These subjects are seen as having a hierarchical structure, in which learners progress in a substantially linear way through levels of difficulty. Approach 2 is more typically used in adult open learning, and with pupils with special educational needs. It often involves agreeing learning goals and making an informal contract between learner and teacher to commit the necessary resources of effort and support to achieve these goals. Its use in classrooms is most common in subject areas such as English and modern languages in which knowledge structure is not thought to be hierarchically ordered, and in which attainment is believed to advance on a broad front, rather than linearly.

## What did 'good differentiators' do?

To try to make sense of the different methods used by teachers, the researchers drew up a profile of common patterns of practice used by teachers who seemed to 'optimise the access of pupils to the curriculum' — practices which could meet the needs identified by the pupils in this study.

These teachers had developed systems for the management of learning which had many of the characteristics of approach 2 in Figure 4, although, like most teachers, they moved between the two approaches:

**They shared the management of learning with pupils:**
- by sharing information (for example on what skills test items tested);
- by giving pupils responsibility for (and support in) the identification of their problems and difficulties;
- by agreeing mutual responsibilities ('You need to do the work and turn up; I'll help you attain the targets we've agreed.') and extending the support system to the parents via reports and parents' night discussions.

**They promoted the belief that attainment could improve:**
by demonstrating
- that agreed learning strategies worked;
- that targets were reached;
- that problems were resolved.

**They used a wide range of sources of information:**
- liaison with primary school staff;
- information from learning support staff;
- profiling;
- specific diagnostic assessment;
- information from classroom observations;
- discussions with pupils.

**...to identify a range of needs:**
- for appropriate levels of work;
- for the selection of realistic targets;
- for additional explanations;
- for assistance with learning strategies or behaviours, for example asking for help;
- for special arrangements for doing homework, revising for tests.

**...to which they responded:**
- by agreeing targets, support required and criteria for success (for example one pupil was to ask for help at least once in a double period and additional help was to be given at the beginning of a problem-solving exercise);
- by giving assistance with problems (for example via differentiated homework);
- by boosting pupils' confidence (for example by using self-referenced assessment which clearly shows progress made; by showing that 'all pupils have areas which can be improved');
- by using a variety of teaching methods judged to be appropriate for different purposes (for example a mixture of individualised learning, group work, whole-class teaching, setting).

**They gave and received continuous feedback:**

- to pupils
  - — on their performances (successes and failures);
  - — on how to tackle their problems;
  - — on how successfully these problems were being overcome.
- from pupils' comments and discussions;
- from formal and informal assessment;
- from exam results;
- from the 'feel' of their relationship with the class and of pupils with each other;
- from pupils' attitudes towards the work, the course and themselves as learners.

**They used a range of sources of support:**

- the skills and time of learning support staff;
- the involvement of parents;
- older pupils to assist with organising resources;
- non-teaching staff.

## Differentiation in the 1990s

Although good teachers have always done many of those things listed here, the professional tools available and the context within which teachers have been required to work have changed considerably over the past decade.

The 5–14 development programme has given a breakdown of the curriculum which allows teachers to chart progress and monitor different rates of learning. The 5–14 guidelines on assessment encourage teachers to 'know and share' what is to be learned and to use pupil attainments as a means of evaluating the success of selected teaching strategies, rather than simply as a way of sorting and classifying pupils. Systems of 'formative assessment' and 'profiling' offer a means of doing this and are evolving rapidly in primary schools and in many secondary subject departments.

Experiences of the Technical and Vocational Education Initiative and of Flexible Learning initiatives have all extended and contributed to professional expertise. Strategies for evaluation, now becoming familiar to teachers, allow them:

- to identify in advance what educational benefits they expect to see from the introduction of any classroom innovation;
- to gauge the extent to which the benefits outweigh the cost in terms of time and effort; and
- to monitor, after the changes are made, the extent to which the intended benefits are being realised.

The model of effective teaching identified here by pupils provides the criteria for evaluation — selecting for development those practices in differentiation which promote increases in the features of effective teaching identified by the pupils is likely to improve the effectiveness of the learning.

Teachers find themselves faced with an obligation to hone their teaching practices in the light of new requirements; in this respect they are learners themselves. Those who are in charge of staff development in schools are responsible for providing a context in which the effective learning of teachers can take place. And since teachers have individual strengths and weaknesses, the provision for their learning must necessarily be differentiated.

The seven points which have been identified as supporting the learning of pupils, are, the researchers believe, also applicable to the learning of teachers. They serve, therefore as a framework for guiding and evaluating the support given to teaching staff as they work to develop the repertoire of complex and highly professional skills which are now recognised as defining the practice of differentiation.

## Further information

### Full reports

More details of the investigations can be found in the following reports, available from the Department of Educational Research, Northern College (Aberdeen Campus), Hilton Place, Aberdeen AB9 1FE.

Simpson M (ed). *Differentiation in the primary school: classroom perspectives*. (1989). Price £5.00.

Simpson M, Cameron P, Duncan A, Goulder J, McPherson A, Roberts A, Smithers I (1989). *Differentiation in the primary school: investigations of learning and teaching*. Price £5.00.

Simpson M and Ure J (1993). *What's the difference? A study of differentiation in Scottish secondary schools*. Price £10.00.

### References

Arlin M (1984). Time, equality and mastery learning. *Review of Educational Research* 54 (1), 65-86.

Bennett N, Desforges C, Cockburn A and Wilkinson B (1984). *The quality of pupil learning experiences*. London: Lawrence Erlbaum Associates.

Smith I (1981). Educational differentiation and curricular guidance: a review. *Educational Studies*, 7 (2), 87-94.

### Staff development

*Differentiation and research: staff development activities for teachers*. A two day tutor's course has been developed for school staff (both primary and secondary) who wish to introduce some of these research findings to colleagues to promote reflection and action on differentiation in their school. Secondary-specific courses based on the research findings are also available. For further information, contact the Inservice Department at Northern College.

## Issues to consider

***How do you match up?***

Do you think you are a 'good differentiator'?

What factors shape the key features of differentiation in your classroom or subject area?

How can you check on how well the tasks you give pupils match their capabilities?

In what ways to you think *your* differentiation practices could be improved?

***How can you plan for improvement?***

Are there aspects of the management of learning and teaching which you could begin to share with pupils?

Is there a way in which you can identify the strengths and weaknesses of your practices by auditing them against the criteria for 'good differentiators'?

Is there a way in which you could get pupils involved in the evaluation of the learning experiences which are offered in your classrooms?

Are there ways of improving your systems of communications with pupils to improve feedback to both parties?

*The views expressed in this paper are those of the authors and do not necessarily reflect those of the Scottish Office Education Department who funded the studies.*

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## Further information

If you have views on ***Interchange*** and/or wish to find out more about RIU's research programme contact the Research and Intelligence Unit (RIU), Scottish Office Education Department, Room 4/48, New St Andrew's House, Edinburgh EH1 3SY.

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